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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	:	Examiner: L. Nguyen
TOSHIMORI MIYAKOSHI	)	
	:	Group Art Unit: 2853
Appln. No.: 09/903,610	)	
	:	
Filed: July 13, 2001	)	
	:	
For: METHOD FOR CONTROLLING THE DRIVE ENERGY OF AN INK JET PRINT APPARATUS AND THE INK JET PRINT APPARATUS	)	June 28, 2004 (Monday)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR RECONSIDERATION

Sir:

In response to the Official Action mailed March 26, 2004, Applicants respectfully request reconsideration and allowance in view of the following remarks.

Claims 1-16 remain pending in the application, with Claims 1, 6, 7, 12 and 13 being independent.

Claims 1-16 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,751,302 (Rezanka) in view of European Patent Application No. 0 569 201 (Ohshima et al.). This rejection is respectfully traversed.

As is recited in independent Claim 1, the present invention relates to a method for controlling the drive energy of an ink jet print apparatus wherein a print element is driven to eject an ink from an ink jet print head to a printing medium for performing printing. The method includes a first step for supplying a plurality of various drive energies for carrying out one ejecting operation successively to the ink jet print head, a second step for monitoring temperature of the ink jet print head in each supply of the plurality of various drive energies for carrying out one ejecting operation, the temperature reflecting a temperature change caused by each supplied drive energy, a third step for judging a threshold drive energy between a condition where an ink ejection of the ink jet print head was induced and a condition where the ink ejection of the ink jet print head was not induced using a value for each supplied drive energy and a value for each monitored temperature, a fourth step for determining a drive condition for ejecting ink on the basis of the threshold drive energy, and a fifth step for driving the print element on the basis of the determined drive condition.

As is recited in independent Claim 6, the present invention relates to a method for controlling the drive energy of an ink jet print apparatus wherein a print element is driven to eject an ink from an ink jet print head to a printing medium for performing printing. The method includes a first step for supplying a plurality of various drive energies for carrying out one ejecting operation successively to the ink jet print head, a second step for monitoring temperature of the ink jet print head in each supply of the plurality of various drive energies for carrying out one ejecting operation, the temperature reflecting a temperature change caused by each supplied drive energy, a third step for

determining a threshold drive condition between a condition where an ink ejection of the ink jet print head was induced and a condition where the ink ejection of the ink jet print head was not induced using a value for each supplied drive energy and a value for each monitored temperature, and a fourth step for driving the print element on the basis of the determined drive condition.

As is recited in independent Claim 7, the present invention relates to an ink jet print apparatus wherein a print element is driven to eject an ink from an ink jet print head for performing printing. The ink jet print apparatus includes a first means, a second means, a third means, a fourth means and a fifth means. The first means supplies a plurality of various drive energies for carrying out one ejecting operation successively to the ink jet print head. The second means monitors temperature of the ink jet print head in each supply of the plurality of various drive energies for carrying out one ejecting operation, the temperature reflecting a temperature change caused by each supplied drive energy. The third means judges a threshold drive energy between a condition where an ink ejection of the ink jet print head was induced and a condition where the ink ejection of the ink jet print head was not induced using a value for each supplied drive energy and a value for each monitored temperature. The fourth means determines a drive condition for ejecting ink on the basis of the threshold drive energy. The fifth means changes the drive energy applied to the print element of the ink jet print head on the basis of the determined drive condition.

As is recited in independent Claim 12, the present invention relates to an ink jet print apparatus wherein a print element is driven to eject an ink from an ink jet print

head for performing printing. The ink jet print apparatus includes a first means, a second means, a third means and a fourth means. The first means supplies a plurality of various drive energies for carrying out one ejecting operation successively to the ink jet print head. The second means monitors temperature of the ink jet print head in each supply of the plurality of various drive energies for carrying out one ejecting operation, the temperature reflecting a temperature change caused by each supplied drive energy. The third means determines a threshold drive condition between a condition where an ink ejection of the ink jet print head was induced and a condition where the ink ejection of the ink jet print head was not induced using a value for each supplied drive energy and a value for each monitored temperature. The fourth means changes the drive energy applied to the print element of the ink jet print head on the basis of the determined drive condition.

As is recited in independent Claim 13, the present invention relates to an ink jet print apparatus wherein a memory for storing drive condition data is provided on an ink jet print head, by driving a print element an ink is ejected from the ink jet print head to a printing medium for performing printing. The ink jet print apparatus includes a first means, a second means, a third means, a fourth means and a fifth means. The first means supplies a plurality of various drive energies for carrying out one ejecting operation successively to the ink jet print head. The second means monitors temperature of the ink jet print head in each supply of the plurality of various drive energies for carrying out one ejecting operation, the temperature reflecting a temperature change caused by each supplied drive energy. The third means judges a threshold drive energy between a condition where an ink ejection of the ink jet print head was induced and a condition where

the ink ejection of the ink jet print head was not induced using a value for each supplied drive energy and a value for each monitored temperature. The fourth means determines a drive condition for ejecting ink on the basis of the threshold drive energy. The fifth means compares the determined drive condition with drive condition information stored in the ink jet print head and, when both are different, updates drive energy information stored in the memory of the ink jet print head with the determined drive condition data.

Rezanka describes a method of controlling the operation of an ink jet printhead so as to compensate for applied energy variations over time. Rezanka first selects an electrical pulse having a nominal pulse length and pulse amplitude (Fig. 5, step 50). A nominal burn voltage is determined based on the amplitude of the selected electrical pulse (step 52). The threshold voltage, that is, the voltage amplitude at which an ink drop is first detected, is then determined (step 54). Afterwards, the ratio of the selected burn voltage to the actually measured threshold voltage is determined. Depending on the ratio, the nominal pulse length is used or modified as the operating pulse.

The Office Action suggests steps 50 and 52 of Fig. 5 of Rezanka can read on the first step recited in Claim 1. However, these steps of Rezanka merely select a nominal pulse length and amplitude and select a burn voltage, and cannot be construed as supplying a plurality of various drive energies for carrying out one ejecting operation successively to an ink jet printhead, as is recited in independent Claims 1, 6, 7, 12 and 13.

The Office Action further suggests that the claimed feature of monitoring the temperature of the ink jet printhead is disclosed at col. 2, lines 45-55 of Rezanka. However, this passage of Rezanka merely describes a prior patent (U.S. Patent No.

5,223,853), in which the temperature of the ink in the printhead is sensed and a combination of power level and time duration of the input signal is selected based on the sensed temperature. This has no relation to steps 50 and 52 in Fig. 5 of Rezanka. Accordingly, Rezanka is also not believed to disclose or suggest monitoring temperature of an ink jet printhead in each supply of the plurality of various drive energies for carrying out one ejecting operation, with the temperature reflecting a temperature change caused by each supplied drive energy, as is also recited in the independent claims. Nor does Rezanka disclose or suggest the remaining steps or elements in the claims.

Thus, Rezanka fails to disclose or suggest important features of the present invention recited in the independent claims.

Ohshima et al. describes a method for judging a discharge state of an ink jet recording head. Fig. 13 of Ohshima et al. describes a detecting sequence for an ink discharge state in which a first predetermined electrical energy E2 that does not induce ink discharge is applied to discharge heaters and a predetermined energy E1 inducing the ink discharge is applied to the heaters. The temperature change after the first energy application (dTC) and the temperature change after the second energy application (dT) are measured. The ink discharge state is considered normal if dT is less than or equal to $K \times dTC$ and is otherwise considered abnormal.

It is respectfully submitted that one of ordinary skill in the art would not modify the control in Rezanka with that of Ohshima et al. because the cited passages of Ohshima et al. are merely for detection of normal/abnormal discharge states. Such detection is not a part of the control in Rezanka and it would not be readily apparent to the

ordinarily-skilled artisan how any specific steps in the method disclosed in Rezanka could be modified to include such detection. Moreover, the motivation noted by the Examiner at col. 22, lines 37-51 of Ohshima et al. merely describes that one embodiment in Ohshima et al. has improved accuracy over a previously-described embodiment therein. Such may be motivation to use one disclosed embodiment of Ohshima et al. over another embodiment disclosed therein, but not motivation to use the overall teachings of Ohshima et al.

Thus, independent Claims 1, 6, 7, 12 and 13 are patentable over the citations of record. Reconsideration and withdrawal of the § 103 rejection are respectfully requested.

For the foregoing reasons, Applicant respectfully submits that the present invention is patentably defined by independent Claims 1, 6, 7, 12 and 13. Dependent Claims 2-5, 8-11 and 14-16 are also allowable, in their own right, for defining features of the present invention in addition to those recited in their respective independent claims. Individual consideration of the dependent claims is requested.

Applicant submits that the present application is in condition for allowance. Favorable reconsideration, withdrawal of the rejection set forth in the above-noted Office Action, and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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